MPED: An ISRU Bucket Ladder Excavator Demonstrator System, Phase II

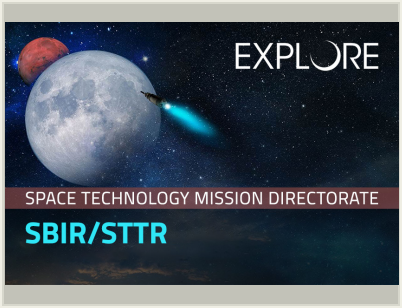
Completed Technology Project (2009 - 2010)

Project Introduction

Abstract: The Multi-Purpose Excavation Demonstrator (MPED) is a commercial effort and a third generation of technology, following Bucket Wheel Excavator and Bucket Ladder Excavator work by the Colorado School of Mines. The Moonraker

TM

is an industrial instantiation, designed to be commercially viable. The proof-of-concept machine is currently under construction. A phase two SBIR consists of: 1) upgrades to the original design, including more appropriate materials improvements and maturation of point solutions, 2) development of a robotic tool arm/turret to cradle, position and manuever the the excavator blade within it's work volume, 3) development of a 'universal' modular tool interface between the excavator blade and the robotic tool arm, 4) physics-based modelling and simulation of the excavator/tool arm/mobility platform ensemble, 5) a simulation which continues to co-evolve into a control systems/human interface, 6) extensive laboratory and field testing of excavator prototypes, particularly forces on buckets, and 7) enhanced systems reliability. Field testing will include technology demonstrations at a Lunar Analogs site. Related contextual topics are undergoing continous examination, including a simplified tool arm manipulation and control method, operations 'in the dirt' at the worksite, exploitation of regolith fines (dust) as a high-yield component of ores, and mitigation of the adverse effects of dust on the excavation system through exclusion, passive electrostatics and other methods. This project draws extensively upon the expertise of CSM alumni who have prior experience in the earlier generations of Lunar Excavator prototypes.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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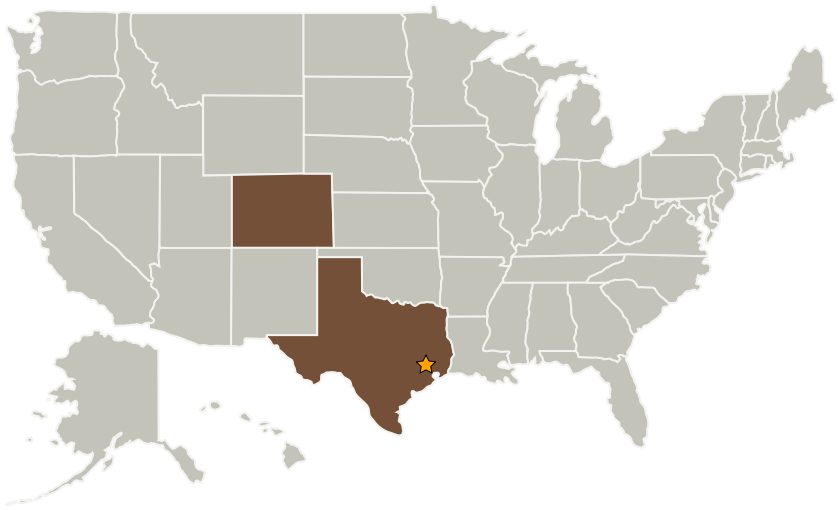
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
sysRAND Corporation	Supporting Organization	Industry	Parker, Colorado

Primary U.S. Work Locations	
Colorado	Texas

Project Transitions

January 2009: Project Start

December 2010: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.3 Manipulation
    - TX04.3.1 Dexterous Manipulation